Lower Boise/Canyon County Nitrate Management Plan

DRAFT

June 2005

Prepared by the Lower Boise/Canyon County Nitrate Management Committee and the Idaho Department of Environmental Quality

Executive Summary

The Lower Boise/Canyon County Nitrate Priority Area (NPA) is located in the Treasure Valley and encompasses a little over one half of Canyon County and a portion of Ada County near Kuna. The area covers 238,149 acres, or about 372 square miles in southwest Idaho. The Canyon County NPA has been placed on the Idaho Department of Environmental Quality (DEQ) nitrate priority list and is ranked the fourth highest in the state in terms of ground water quality degradation.

The area has been critically impacted by nitrate contamination that may affect an estimated population of 80,806 residents who depend on this aquifer system as their primary source of drinking water. Ground water monitoring in the Lower Boise/Canyon County NPA has demonstrated elevated nitrate levels above the Environmental Protection Agency's established Maximum Contaminant Levels (MCL) for health concerns. The results of the 640 samples from domestic wells initially considered for the nitrate priority list included 32% with nitrate levels above 5 mg/l, the action level, and 9% of the wells with nitrate concentrations above the nitrate MCL of 10 mg/l.

To address this issue, the Canyon County Nitrate Management Planning Committee (the Committee) was formed to develop recommended strategies to reduce nitrate levels. The Committee has met in open public meetings since March 2004 to form the recommendations in this document. The Committee has agreed to promote and encourage a voluntary approach for addressing ground water contamination by nitrate in the NPA.

In Canyon County, forty-eight percent of the population resides on rural property. Most of the residents within this entire area have their own domestic well(s) for their water needs. Unless their wells have been included in a ground water study, their water quality will be unknown.

The Committee identified land-use activities that can potentially affect nitrate levels for ground water. To supplement existing regulations governing these activities, recommendations for each activity are provided in this document. These activities can be summarized as follows:

Agriculture – Employ irrigation and nutrient management techniques.

Industrial Wastewater Land Application – Reliance on existing regulatory program.

Residential –Encourage owners of existing systems to conform to guidelines and regulations established for new construction of septic systems and wells. Residential landscaping and animal pasture activities should follow the

suggestions in the agriculture and animal feeding operation portions of this document.

Animal Feeding Operations (AFO) – Recommend separation, minimization, and proper management of waste products for all sizes of animal feeding facilities.

Stormwater – Ongoing regulation by local jurisdictions and additional activities in Urbanized Areas (U.S. Census Bureau definition) through implementation of NPDES permits.

The Committee will lead a cooperative effort with IDEQ, the Idaho State Department of Agriculture (ISDA), the Health Districts and the Idaho Department of Water Resources (IDWR) to implement this plan. Other governmental agencies will also assist in conducting surveys, making presentations, and providing information. Education, public awareness, and adoption of recommendations are key to the success of this plan.

Presently adoption of this plan is strictly voluntary. A compilation of ground water monitoring data collected by state agencies will be made each year by the IDEQ, with the support of the Committee. A more extensive review and evaluation of the effectiveness of the plan will be completed as a joint effort among participating agencies and the Committee periodically. At each step, modifications to the plan will be discussed. If improvements to ground water nitrate concentrations are not noted, regulatory intervention may become necessary.

1.0 Introduction

The Lower Boise/Canyon County Nitrate Priority Area (NPA) is located in the Treasure Valley and encompasses a little over one half of Canyon County and a portion of Ada County near Kuna. The area covers 238,149 acres, or about 372 square miles in southwest Idaho. The Lower Boise/Canyon County NPA has been placed on the Idaho Department of Environmental Quality (DEQ) nitrate priority list and is ranked the fourth highest in the state in terms of degradation.

The area has been critically impacted by nitrate contamination that may affect an estimated population of 80,806 residents who depend on this aquifer system as their primary source of drinking water. Ground water monitoring in the Lower Boise/Canyon County NPA has demonstrated elevated nitrate levels above the Environmental Protection Agency's established Maximum Contaminant Levels (MCL) for health concerns. The results of the 640 samples from domestic wells initially considered for the nitrate priority list included 32% with nitrate levels above 5 mg/l, the action level, and 9% of the wells with nitrate concentrations above the nitrate MCL of 10 mg/l.

Land-use activities that may play a significant role include agricultural fertilization, feedlots, livestock grazing, livestock waste, wastewater land application, stormwater runoff, and septic systems. Older or poorly constructed wells may be one factor in the deterioration of ground water quality by providing a conduit to introduce contamination. This management plan has been developed with the intent of educating the public on methods to prevent additional nitrate degradation and to improve existing conditions by education and voluntary actions.

The Committee has met in open public meetings since March 2004 to form the recommendations in this document. The Committee has agreed to promote and encourage a voluntary approach for addressing ground water contamination by nitrates in the NPA. Progress will be based on the evaluation process outlined in Section 6.0 Evaluation of Management Plan Progress and Success.

The objective of the proposed management strategies listed in this plan is to reduce ground water nitrate concentrations from local sources. The goals and objectives for this plan are as follows:

Goal: Reduce the level of nitrate in ground water.
Objective: Reduce sources of nitrate in a responsible and economical manner.

Goal: Actions taken under this Plan should be based on the best available scientific information.
Objective: Identify "hotspots" using results of monitoring studies and target activities to these areas.

Goal: Increase awareness of nitrate levels in ground water and potential health effects.

Objective: Target pregnant women and infants, the highest risk group, as the highest priority for education and outreach activities.

Nitrate as a Contaminant

Nitrate is a form of nitrogen found in the environment and comes from various sources. When plants and other organic matter decompose, nitrogen is converted to inorganic forms, mostly nitrate. Another environmental source of nitrate is discharge from septic or sewer systems. Nitrate also gets into the soil from animal feedlot wastes and nitrogen-based fertilizer application.

The U.S. Environmental Protection Agency has established a federal drinking water standard, called a Maximum Contaminant Level (MCL) of 10 milligrams per liter (mg/L), or 10 parts per million (ppm) for nitrate. The Idaho groundwater quality standard is also 10 mg/L. Nitrate concentrations of two mg/l generally are considered to be above background in the Treasure Valley. Public water systems are required to sample for various contaminants, including nitrate, on a regular basis. There is no required sampling of domestic or stock wells.

Infants younger than six months are sensitive to nitrate poisoning, which may result in serious illness or death. The illness occurs when nitrate is converted to nitrite in a child's body. Nitrite reduces oxygen in the child's blood, causing shortness of breath and blueness of skin, a condition called methemoglobinemia. This illness can be a serious condition in which the child's health deteriorates rapidly over a period of days. Other health effects may occur with long-term high exposure to nitrate. These include problems with reproduction and development, as well as cancer.

Nitrate is often an indicator of aquifer vulnerability with the presence of higher concentrations of nitrate in ground water associated with land use activities. Whenever nitrogen-containing compounds come into contact with soil, a potential for nitrate leaching into groundwater exists. Nitrate is highly soluble (> 1 kg/L) and will stay in solution in the percolation water, after leaving the root zone, until it reaches the groundwater. Nutrient leachate usually moves vertically through the soil and dilutes rapidly downgradient from their source.

The primary factors affecting leachate movement are the layering of geologic materials, the hydraulic gradients, and the volume of the leachate discharge. A ground water vulnerability report prepared by the U.S. Geologic Survey (Rupert 1991) shows the Lower Boise/Canyon County area as having a high or very high vulnerability to ground water contamination. In this study, the probability for determining vulnerability was based upon depth-to-water, soils and recharge.

Nitrate Area Prioritization Process

IDEQ chairs the Ground Water Monitoring Technical Committee to compile the state's ground water quality data and to coordinate monitoring activities. This committee is comprised of technical representatives from local, state, and federal agencies and interested parties who have met quarterly since 1996 to analyze trends in Idaho's ground water quality. From this process nitrate became a concern for IDEQ due to the potential health risks to humans and livestock.

Pursuant to guidance provided in the DEQ Policy Memorandum PM004, "Policy for Addressing Degraded Ground Water Quality Areas", a statewide list of significantly degraded areas for nitrate was identified. The degraded areas were delineated using ground water quality monitoring analytical results from various agencies combined with hydrogeology and land use. The sources providing analytical results include:

Idaho Department of Water Resources (IDWR) – Statewide Ambient Ground Water Quality Monitoring Program

Idaho State Department of Agriculture (ISDA) – Regional and local ground water monitoring quality projects for agricultural related contaminants in agricultural areas

United States Geological Survey (USGS) – various ground water quality monitoring projects through out Idaho.

Public Water Systems – required monitoring and reported to Idaho DEQ

Idaho DEQ – Regional and local monitoring projects in response to detections found from other sources including health districts or originating from a complaint.

If 25% of ground water samples in a hydrogeologically similar area are greater than or equal to ½ the drinking water standard for nitrate (NO3) or 5.00 milligrams per liter (mg/L) for public water systems, the area was delineated as an area of ground water quality degradation nitrate priority area. The drinking water standard for nitrate (NO3) is 10.00(mg/L). In Idaho, 25 areas met the criteria for being degraded by nitrate in the ground water.

The Nitrate Area Ranking Process was developed by IDEQ, in consultation with the Ground Water Monitoring Technical Committee to provide rationale for numerically ranking areas in Idaho with identified groundwater degradation from nitrate and to develop a statewide priority list for implementation of protective management strategies or corrective action measures within these areas.

The prioritization process considered three weighted principal criteria: population, existing water quality, and water quality trends. The population criterion considers the number of people living in the area that are potentially drinking nitrate-degraded water. The water quality criterion considers the concentration of nitrate contamination with respect to drinking water standards and the water quality trend criterion considers water quality trends over time within each priority areas.

The Lower Boise/Canyon County Nitrate Priority (See Figure 1 below) area is ranked as #4 with 32% of ground water samples being greater than or equal to ½ the drinking water standard and 9% exceeding the standard. A statistical trend analysis by the U.S. Geological Survey (USGS) of ground water quality in the Canyon County/Lower Boise Nitrate Priority area has determined the area to have an increasing trend in nitrate concentrations. The results of the USGS study used to help rank nitrate priority areas can be accessed through the following link: Analysis of Nitrate Concentration Trends in 25 Ground Water Quality Management Areas, Idaho, 1961-2001 (pdf on U.S. Geological Survey Web site)

Data used to score priority areas is updated on a regular basis, and changes to the ranking list are re-issued every five years. Monitoring data collected by the Idaho Department of Water Resources in 2003 indicated that the concentrations of nitrate in this area continue to show an increasing trend, and moreover, are increasing in this area more than any other area in the State.

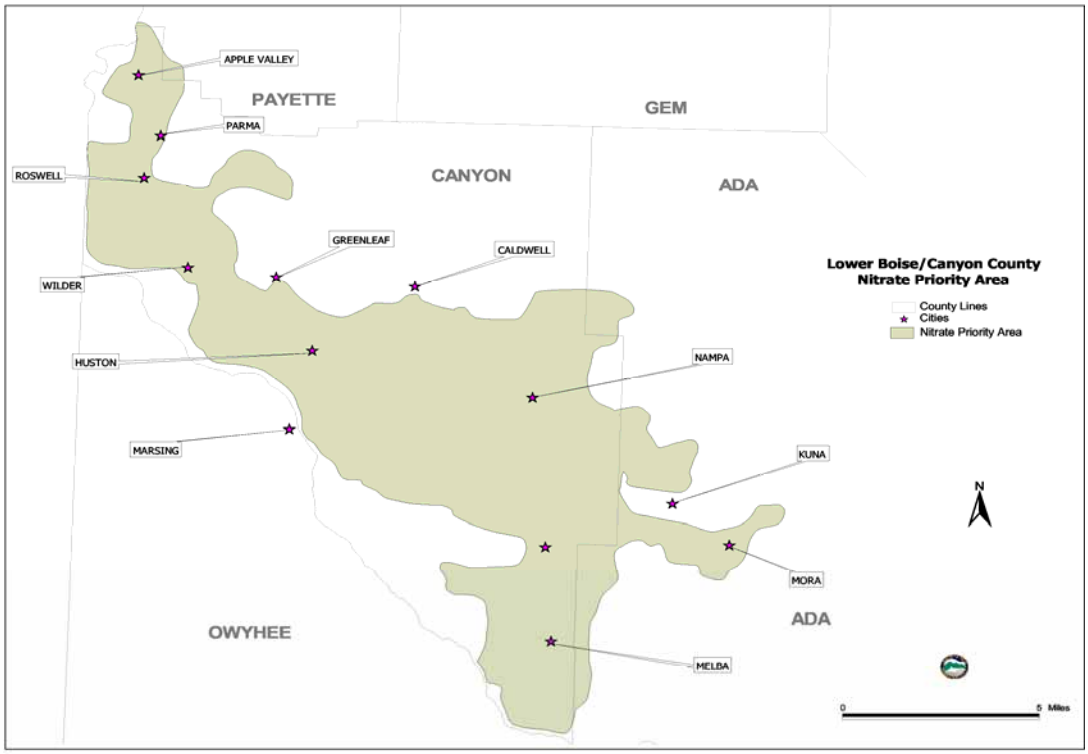


Figure 1. Lower Boise/Canyon County Nitrate Priority Area

2.0 Setting and Hydrogeology

The Lower Boise/Canyon County NPA is located within the western Snake River Plain, which is a topographic depression that extends across southern Idaho into eastern Oregon. The prominent physiographic feature is the Snake River Canyon.

The general stratigraphy of the Western Snake River Plain from the surface downward consists of sedimentary deposits underlain by basalt flow, known as the Snake River Group, which are underlain by older sediments and basalt, known as the Idaho Group. The upper thick zone of sediments is up to 6,000 feet thick (Wood and Anderson, 1981). Tertiary volcanics underlie the Idaho Group. The granitic Idaho Batholith is generally considered to be the basement rock.

A substantial, laterally extensive layer of clay is found at depths of 300 to 700 feet below ground surface. The clay is important because it represents, in some areas, a significant aquitard separating shallow overlying aquifers from deeper zones. The clay, often described in well logs as having a blue or gray color, has been observed as far west as Parma, and as far east as Boise. The clay varies from a few feet to a few hundred feet in thickness. Wood indicates the blue clay is the lower part of the Idaho Group. In general, sediments above the blue clay are coarser-grained sands and gravels than the fine-grained interbedded sands, silts, and clays underlying the “blue clay.”

The drinking water aquifers in the Treasure Valley are grouped into two hydrogeologic systems. The Treasure Valley Shallow system consists of those aquifers that are generally within 250 feet of the land surface and above a distinct layer in the earth known as the “blue clay”. The Treasure Valley Shallow system is made up of gravels and sands with some thin layers of clay between them in some places. The Treasure Valley Deep system consists of the aquifers that are generally deeper than about 250 feet and are below the blue clay. These aquifers are made up of fine-grained sands that are usually separated by thick layers of clay whose color is often blue or gray (Neely, 2001).

The recharge to the shallow aquifers is largely from seepage from canal systems and infiltration from irrigated agriculture (Lindholm, 1996; Petrich and Urban, 2004). Additional recharge to the shallow aquifers occurs from interaction with other water bodies (e.g., Lake Lowell), and possibly from upper reaches of the Boise River (e.g., Barber Dam to Capitol Street Bridge) during high flows. Additional recharge sources include mountain front recharge, underflow from the granitic Idaho Batholith and tributary sedimentary aquifers, and direct precipitation.

Discharge from the Treasure Valley Shallow aquifer system often is to local drains or streams. The time from recharge to discharge in these shallow flow

systems (residence times) probably ranges from days to tens of years. In contrast, the Treasure Valley Deep aquifer system is thought to discharge primarily to the Boise and Snake Rivers in the western and southwestern parts of the valley.

The general direction of the ground water movement is dependent on location. The topography, Boise River, Snake River, and irrigation ditches have their own impact on the localized ground water direction. The Treasure Valley Deep aquifer system begins in the eastern part of the valley, as indicated by downward hydraulic gradients in the Boise Fan sediments described by (Squires et al., 1992).

Ground water for municipal, industrial, rural domestic, and irrigation uses in the Treasure Valley is drawn almost entirely from Snake River Group and Idaho Group aquifers. Many domestic wells draw water from shallow aquifers, such as those in the Snake River Group deposits. Larger production wells (for municipal and agricultural uses) draw water from the deeper Idaho Group sediments.

Soils

General soil types in the Canyon NPA are mixed alluvial sediments that are well-drained and somewhat excessively drained fine sandy loams, silt loams and loamy fine sands on fans and terraces. Soils affect water quality through pollutant attenuation. The impact to ground water quality from nitrates is dependent on the nature and thickness of unsaturated soil and other geologic materials overlying ground water. Critical soil attributes are organic matter, cation exchange capacity and depth. Appendix A-1 summarizes soil descriptions taken from the Soil Survey of Canyon Area, Idaho (Priest et al., 1972). The descriptions are very general, and only consider the major soil units in the area.

Land Use

The land use in the Lower Boise/Canyon County NPA is predominately used for agricultural purposes (See Figure 2, below). The percent of land uses within the boundaries of the NPA have not been calculated. Land uses for Canyon County as a whole are indicative of the land uses with the NPA.

Total percent of land used within Canyon County for agricultural purposes is 79.3%, according to Canyon County Assessor's Office 2004 statistics. The remaining 20.7% of the land is commercial (.2%), industrial (.2%), residential (8.2%), urban (within city limits – 6.1%), gravel pits (.3%) or exempt (5.8%).

Table 1. Existing Land Use in Canyon County 2004

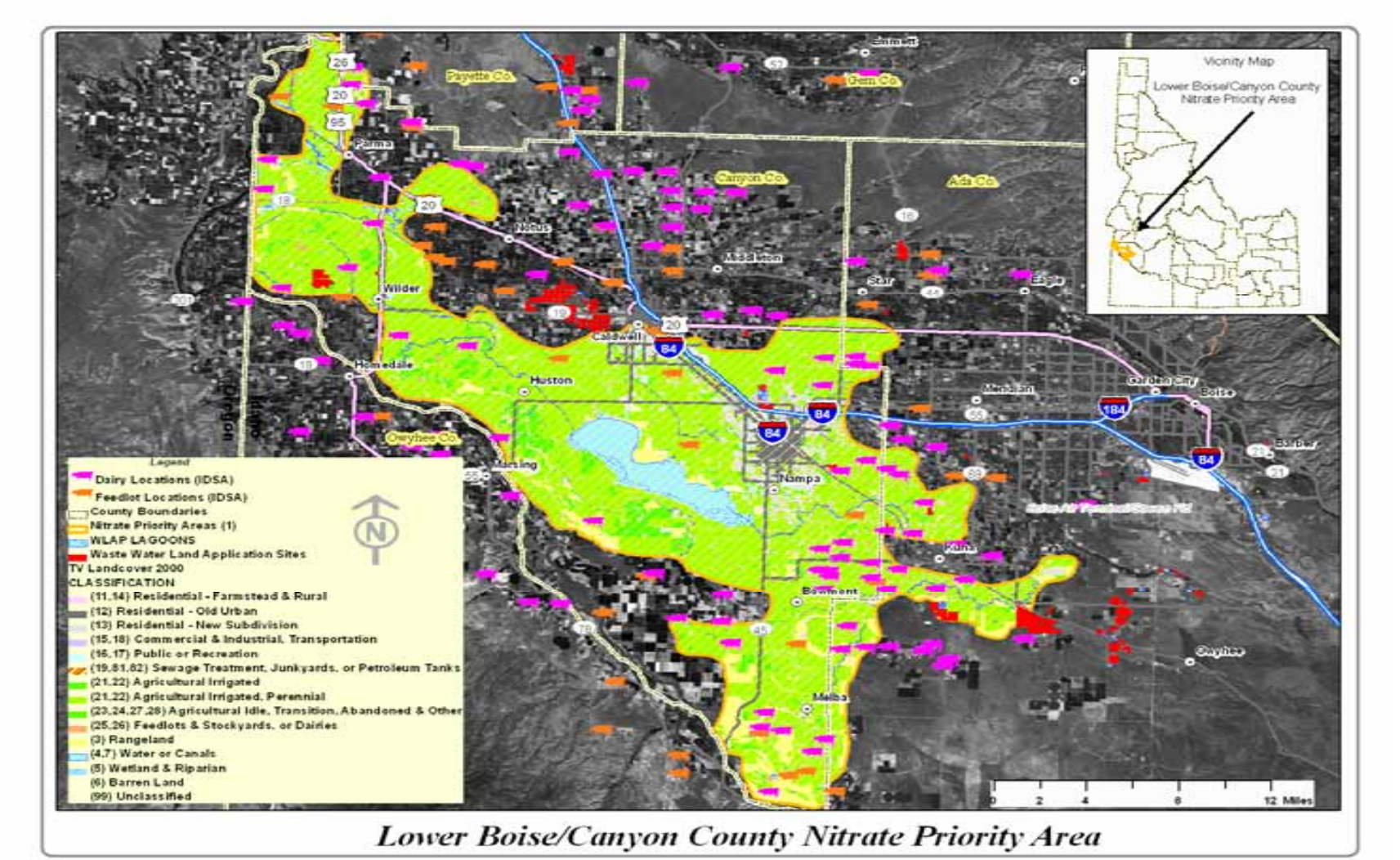
Land Use	Acres	Percent Total
Agricultural (irrigated agriculture and pasture)	273,787	75.3%
Dry Grazing	14,549	4%
Commercial	550	.2%
Gravel Pits	1,028	.3%
Industrial	662	.2%
Residential	29,725	8.2%
Urban (in city limits)	22,082	6.1%
Exempt Lands	21,213	5.8%
Total	363,596	100%
Source: Canyon County Assessor's Office		

Within the NPA, the cities of Nampa, Caldwell and Kuna are currently experiencing rapid growth of their city population. Other cities in this area are experiencing moderate growth. The cities in this area have public drinking water systems available to the residents in and near the city limits and sanitary sewer services are generally available.

In Canyon County, forty-eight percent of the population lives on rural property. These residents within this entire area have their own domestic well(s) for their water needs. Unless their wells have been included in a ground water study, their water quality will be unknown for agency use. The rural population relies on septic systems.

In Ada County, the area in the nitrate priority area is mostly zoned Rural Preservation, which is a 40-acre minimum size zone. A farm development right is available on some of the properties in this zone. It allows for a one acre split on a parcel that has a minimum of 40 acres, but does not allow for more density.

There are some areas closer to Kuna that are zoned Rural Residential, which is a 10 acre minimum size zone. A nonfarm subdivision may be allowed on parcels with greater than 20 acres in this zone. It allows for a cluster subdivision with 75% deed restricted open space. With the nonfarm subdivision a community sewer system is required. A community well is required if there are more than 10 lots.



Lower Boise/Canyon County Nitrate Priority Area

Figure 2. Land Uses Within the NPA

Ground Water Quality

The federal drinking water standard, called a Maximum Contaminant Level (MCL) is 10 milligrams per liter (mg/L) for nitrate. The Idaho groundwater qualities standard is also 10 mg/L.

Figure 3 shows an outline of the Lower Boise/Canyon County Nitrate Priority area, with the majority of the area within Canyon County. The ground water sampling sites are color coded by nitrate concentration, with red indicating samples exceeding the drinking water standard of 10 mg/L. Yellow indicates nitrate concentrations ranging from 5.00 – 9.99 mg/L. Symbols represent the various sources of analytical results. ISDA sample sites are circles, Public Water Systems are triangles and the remaining agencies are squares.

Domestic and irrigation wells were used as sampling sites. Wells of varying depths that included both the Treasure Valley shallow and deep aquifers were sampled. The final selection of wells was based on a thorough coverage of the sampling area to eliminate clustering of wells.

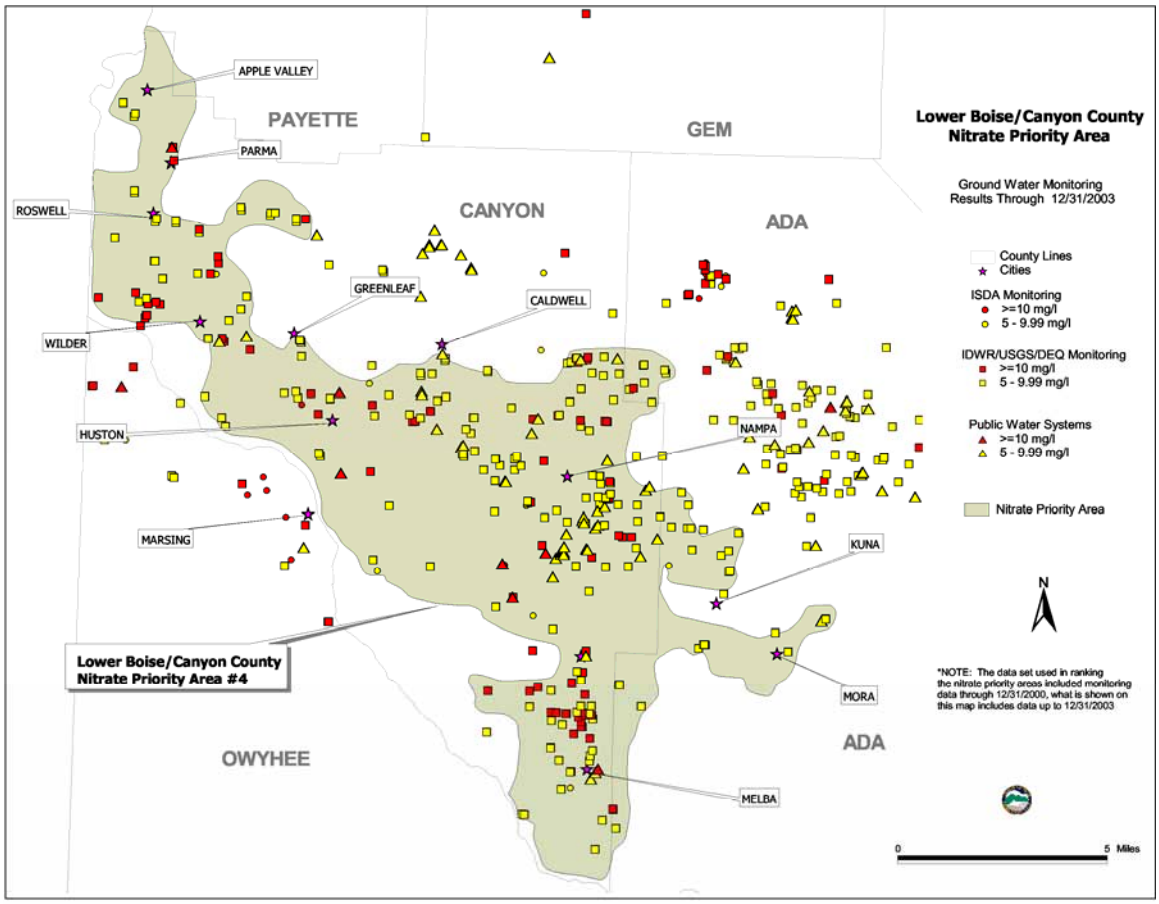


Figure 3. Lower Boise/Canyon County Nitrate Priority Area with nitrate results greater than or equal to the drinking water standard.

U.S. Geological Survey (USGS) ground water monitoring data in the Canyon County ground water quality management area includes 1,670 analyses from 613 wells from 1961-2001. Of the 523 total wells with nitrate analyses, 364 are domestic wells, 55 are irrigation wells, 50 are monitoring wells, 20 are public wells, 10 were stock wells, one was a fire well and the remaining 23 had no use coded to them. The majority of the wells (greater than 451) were completed at depths of less than 1000 feet below the land surface. Wells with nitrate concentrations greater than 5 mg/l were less than 400 feet in depth.

A Canyon County Ground Water Study (December 2000) was conducted by DEQ and USGS in 1996 and 1997. The 1996 work included Nampa and surrounding area and the 1997 work was conducted along Boise R. from Middleton to Snake River. The study found nitrate levels exceeded 10 mg/L in 24 of 314 samples (8%). Twenty percent of the wells had nitrate levels between 5mg/L and < 10 mg/L and 26% had elevated nitrate up to 5 mg/L

Nitrate is often an indicator of aquifer vulnerability because higher concentrations are generally caused by land use activities. More recent data collected between 1997 and 2000 show that 35 percent of the Statewide Program wells in the Treasure Valley shallow system had nitrate levels equal to or greater than 5 milligrams per liter, and ten percent had concentrations over 10 mg/l (Neely, 2001). Nitrate concentrations of two mg/l generally are considered to be above background in the Treasure Valley, and 10 mg/l nitrate is the drinking water standard. The map below shows the distribution of elevated nitrate concentrations in the Treasure Valley from the Statewide Program.

In 2003, 64 wells were sampled in the NPA. Three wells (4.5%) had nitrate concentrations greater than 10 mg/L, 12 wells (19%) had nitrate concentrations between 5.0 to < 10 mg/L, and 16 wells (25%) had nitrate concentrations between 2.0 to < 5.0 mg/L (IDWR, 2004). Trend analyses from the Statewide Ambient Ground Water Quality Monitoring program (Neely 1998, 1999, 2001, 2003) shows an increase in nitrate levels in groundwater in the Canyon County NPA.

3.0 Potential Sources of Nitrate Ground Water Contamination

A nonpoint pollutant source is a source of contamination with no visible or obvious point from which the contamination originates. The Committee identified the following land-use activities with practices that could affect ground water nitrate levels. When these land-use practices are managed appropriately, they do not result in water quality degradation. However, land-use practices such as these can lead to decreased water quality when poorly managed or inadequately controlled.

Irrigated Agriculture

The major sources of nitrate from agricultural activities come from all forms of fertilizers, legumes and organic matter. Nitrogen not utilized by plant growth is stored in the soil and can be leached to ground water as nitrate, if sufficient water is available to move it through the soil profile.

Irrigated agriculture is the dominant land use in the county with approximately 273,787 acres, or more than 75% of the County under cultivation. Several irrigation methods are used in the Canyon County NPA; including gravity, solid set, hand line, wheel line, drip, surge, and center pivot. All irrigation systems have the potential to increase nitrate levels in ground water. Gravity methods of irrigation are most highly disposed to the leaching of nitrate through the soil profile due to the volume of water applied.

Factors that influence the degree of nitrogen leaching in agriculture areas are soil type, irrigation amounts and practices, nitrogen source and application rate, and the season of application. Over-application of nitrogen can occur in several ways:

- Applying fertilizers at rates greater than crop uptake.
- Failing to account for residual and organic nitrogen sources present in the soil profile, especially nitrogen-fixing crops.
- Inappropriate timing of nutrient application with regard to crop needs.
- Failure to account for other nitrogen sources such as irrigation water.
- Improper handling of solid agricultural wastes.

A number of programs and activities address irrigation practices. The University of Idaho's Nutrient and Pest Management Program is an educational effort based on soil testing programs and soil fertility recommendations by soil type and crop. The NRCS with the Idaho Soil Conservation Commission and local soil conservation districts, coordinate and implement an number of programs that use cost sharing of best management practices and educational outreach to reduce nutrient loads from agriculture and provide nutrient management planning and engineering technical support, including the Environmental Quality Incentives Program (EQIP), the Soil and Water Conservation Assistance Program, and the State Water Quality Program for Agriculture.

Animal Feeding Operations (AFO) and Dairies

Sources of nitrate from Animal Feeding Operations (AFO) include runoff, facility wastewater, and manure. An AFO is generally defined as the holding or confining of animals in buildings, pens or lots. Regulations for protecting ground water are in place for larger AFOs (greater than 200 dairy cows or 1000 steers) regarding solid and liquid effluents.

Disposal of on-site animal waste (manure) from AFOs is regulated through a Memorandum of Agreement between USEPA, IDEQ, and ISDA. Facilities with over one thousand animals must have an USEOA National Pollutant Discharge Elimination permit as required under federal law, if there is a discharge from the site. A facility smaller than one thousand animals may be required to obtain a permit if the ISDA Director determines that it is necessary.

ISDA has the authority to promulgate and enforce rules for dairy operations. Non-compliance with the rules or discharge violations may result in revocation of authority to sell milk for human consumption. ISDA also conducts dairy waste inspections to prevent waste releases and evaluate waste collection, treatment, handling, disposal, and management procedures for compliance with the Clean Water Act and ISDA regulations. The practice of exporting waste off-site is currently not regulated by ISDA and was identified as a significant potential source of nitrate contamination.

ISDA also monitors ground water nitrate concentrations yearly at all dairies in Idaho and has the authority to conduct follow-up testing and evaluation of dairy operations and wells showing elevated nitrates. Additionally, ISDA has the authority to require further compliance and operation changes where there is evidence that a dairy is a source of nitrate and contributing to aquifer degradation. To date, follow-up has been restricted due to limited staff resources.

Industrial Wastewater Land Application Areas

Wastewater land application facilities generate nutrient rich process water. Such facilities are among the few sources of nitrate that are already regulated. These facilities are required to obtain a Waste Water Land Application Permit (WWLAP) to apply wastewater to land. IDEQ's regulatory waste discharge permit system requires land appliers to:

- Schedule process water applications to meet crop nutrient and water needs.
- Develop management plans for irrigation and nutrient use.
- Develop water and nutrient budgets.
- Periodically sampling wastewater, ground water, soil and crops as required by permit.

- Prepare reports on how activities are functioning and whether the process is meeting the goals that were established.

Residential Land Uses

Septic Systems

Domestic septic systems may contribute to elevated ground water nitrate concentrations. The standard household septic system is not designed to effectively treat wastewater for nitrates. Properly operating systems deliver a certain amount of nitrate to the ground water (an average of about 45 mg/l nitrate (U.S. EPA 1978)). Generally this source of nitrate is not a concern when the volume of wastewater is relatively small compared to the volume of ground water. Ground water problems can occur in areas where high septic densities exist. Areas of high septic density occur primarily within the urban growth boundaries of cities or in isolated subdivisions. In low-density settings, the impact to the ground water is low because of dilution by the ground water and the small volume of discharge spread over a large area. However, as densities increase, the discharge volume increases, and may overcome the ground water's ability to dilute the wastes, thereby increasing the potential for contamination.

Idaho's septic system regulations under IDAPA 58, Title 1, Chapter 03, Rules for Individual/Subsurface Sewage Disposal Systems, and IDAPA 58, Title 1, Chapter 15, Regulations Governing the Cleaning of Septic Tanks are fully established. Implementation is primarily through Idaho's health districts with technical assistance from IDEQ.

The health districts implement the day-today activities in the program by conducting site evaluations, issuing system permits, issuing septic tank pumper licenses, and conducting inspections. This entails establishing design standards and accepted waste management practices for private septic systems, establishing the criteria under which sanitary permits are issued to build private septic systems that discharge pollutants to water of the state, and establishing soil site evaluation standards for placement of septic systems.

IDEQ responsibilities include plan and specification reviews, review of nutrient-pathogen (N-P) studies, heading the technical guidance committee, and reviewing new technologies and providing training courses for installer and pumpers.

Other Residential Activities

Several other activities associated with residential development were also identified as possible contributors to the nitrate problems in residential areas:

- Excessive fertilization related to landscaping, lawns and gardens
- Over-watering related to landscaping, lawns and gardens

- Well construction, well abandonment, wellhead management and well location
- Animal pastures and/or ranchettes (small residential acreages)

The combination of these activities with septic system discharge makes residential developments a potential source of nitrate contamination in ground water.

Contaminated water moving down a well casing from the land surface to ground water or moving between aquifers via well bores can contribute to the nitrate contamination problem. Improperly sealed wells can facilitate water movement, possibly carrying contaminants from land surface to the ground water or between aquifer units.

Locating a septic system or other contamination source too close to or up gradient from a poorly sealed well may cause the well to capture contaminated water and allow contaminated water to move further into the aquifer or between aquifers. Improperly abandoned wells provide a direct connection between the surface and the aquifer, which could allow surface contamination a direct path to ground water.

Pasturing animals on small acreages can degrade ground water if not managed properly. Pasture management involves more than just grass care. It involves managing the interrelationships among animal, plants, and soil (Jensen 2002).

Information for rural residential homeowners is currently available from the Cooperative Extension Service and through the Home*A*Syst Project (H*A*S). The H*A*S is designed to help homeowners become aware of conditions or practices on their property that increase the risk of drinking water contamination. The H*A*S materials allow a homeowner, farmer, or rancher to assess practices and activities for their potential to contaminate groundwater. The fact sheets provide information about practices and structures that can help reduce the risk of groundwater contamination. The Idaho Association of Soil Conservation Districts coordinates this project

<u>Stormwater Disposal</u>

Land development increases stormwater runoff volumes and pollutant concentrations. Stormwater runoff contains a variety of contaminants, including nutrients. Nitrate has a low to moderate groundwater contamination potential for both surface percolation and subsurface infiltration/injection practices because of its relatively low concentrations found in most stormwater (Pitt, et al., 1994).

The most common methods of stormwater management include ponds (retention, detention, evaporation and infiltration), seepage beds, swales or some combination. The practices, which infiltrate stormwater, have the greatest potential to contribute nitrate to groundwater.

Over the past thirty years, a number of local jurisdictions have implemented stormwater management functions at various levels of authority. These entities may have requirements for the detention or retention of storm water runoff when development occurs. In practice, the jurisdictions that require on-site control of post-development flows expect retention of runoff. This is because few developments have access to a drain, canal or water body for an off-site discharge.

In addition, federal stormwater regulations require some municipalities, construction sites greater than one acre and certain types of industrial facilities to obtain permits from EPA to discharge storm water. In the Lower Boise/Canyon County Nitrate Priority Area permits are required for Nampa, Caldwell and urbanized areas, as defined by the U.S. Census Bureau, within Canyon County. The federal regulations require that municipalities implement programs to control runoff from new development and redevelopment.

4.0 Nitrogen Budget

A nitrate budget was developed for potential sources of nitrogen (referred to as loads) that may impact water resources—especially ground water resources—within the boundaries of Canyon County. A description of how the nitrate budget was developed is included in Appendix B results are displayed in Figure 4 below. The largest potential source of nitrogen that could impact ground water in Canyon County is nitrogen from fertilizer applications (47.7%). The second largest potential source of nitrogen is from dairy and cattle operations (37.5% overall). The remaining 14.8% of the potential nitrogen sources can be attributed to domestic/urban waste (0.4%), other livestock (4.6%), legume crops plowed down (6.1%), industrial sources (2.4%), and precipitation sources (1.4%).

This does not mean the results of this evaluation should be interpreted to indicate that localized problems cannot occur from the smaller sources of nitrogen. What it does mean is that the bulk of the potential nitrogen loading that can occur to ground water in Canyon County can be expected to come from farming and livestock operations within the county.

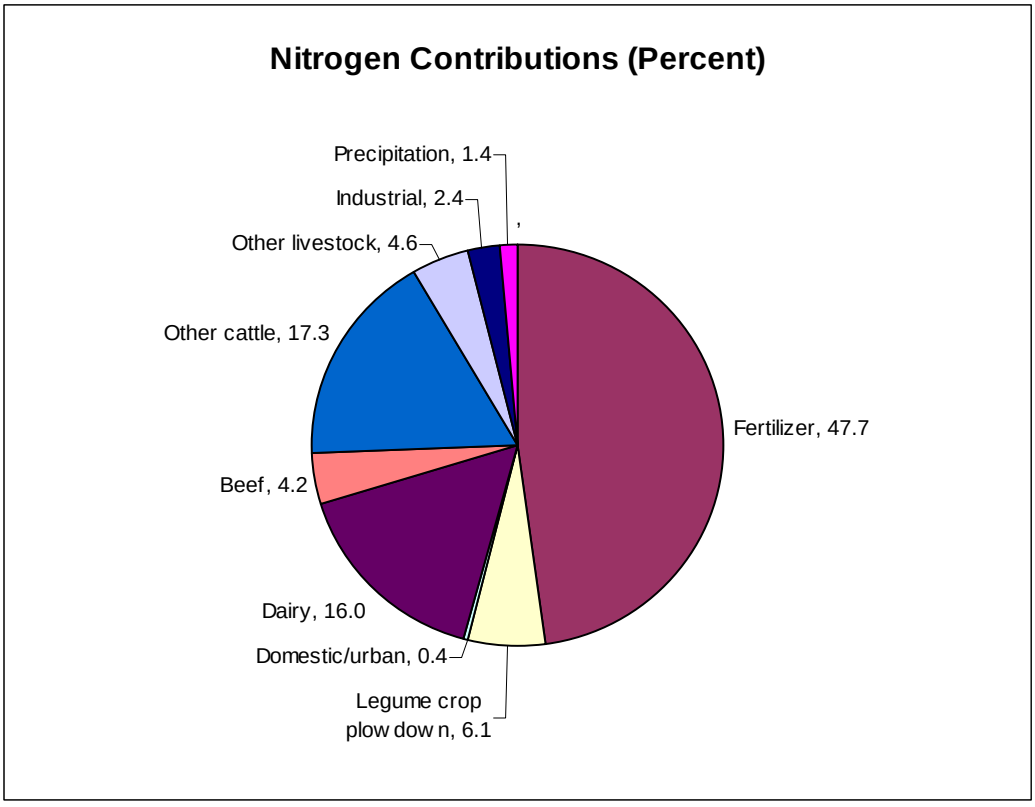


Figure 4. Estimated nitrogen loading for Canyon County, by source.

5.0 Recommended Strategies

A variety of tools can be utilized in the implementation of strategies to reach the stated goals of the Plan. These can be generally categorized as education, on-the-ground actions, preventative maintenance and program coordination.

- Technical Assistance programs in the form of literature, videos, workshops, etc. that can be shared with residents and local agencies. Source of this information include the IDEQ, the University of Idaho Cooperative Extension Service, the Soil Conservation Commission and the local Soil Conservation Districts.

- Information/education programs are closely tied to the technical assistance program, but expanded to include a more broad-based public education program. Educational efforts should be tied together and targeted. Education should be the responsibility of many entities, both governmental and private. Outreach efforts will be more successful if they address the primary motivators for behavioral change, which are money and the perception of risk. Included in the expanded program are public meetings, speaking engagements, educational activities in conjunction with local schools, workshops, and a series of public service messages through a variety of media including newspaper, television and radio.

- Best Management Practices (BMPs) including structural, vegetative, and managerial strategies for agriculture, stormwater management, and rural residential land use activities. BMPs are a practice or combination of practices determined to be the most effective, practicable means of preventing or reducing the amount of pollution generated.

The planning committee considers education to be one of the most effective methods for meeting the goals of this Plan. On-the-ground application of effective BMPs is also crucial to achieving the nitrate reductions.

IDEQ, the Planning Committee, the affected private landowners, and other agencies will cooperatively implement the Plan with input from the public. IDEQ will oversee and track overall progress and monitor the ground water system. IDEQ will also work with local governments on urban/suburban issues.

Stakeholders (landowners, local governing authorities, taxpayers, industries, and land managers) are the most educated regarding the pollutant sources and will be called upon to help identify the most appropriate control actions for each area.

The following tables provide an initial list of proposed management strategies developed by the Committee. Potential participants are also identified.

Table 2. Education/Outreach Strategies

Implementing Entity	Strategy
Cooperative Extension Service, Committee	Provide education to all fertilizer users through Extension Service agents, workshops, a web site and materials such as newsletters and fact sheets. Information should address proper irrigation water application and fertilizer application procedures, rates (based on University of Idaho guidance), and timing, with consideration for crop up-take, migration of excess nitrates, and impacts to groundwater.
Cooperative Extension Service	Encourage ongoing outreach and provision of information by Cooperative Extension Service to small acreage operations and part-time agricultural operations (hobby farms).
ISDA, SCDs, NRCS	Continue to educate operators on impacts to groundwater and BMPs through nutrient management planning process. Update operators annually through annual site visits and evaluation.
IDEQ, Health Districts	Distribute educational materials to at-risk populations to increase awareness of nitrate contamination and associated health problems.
IDEQ, Health Districts	Request analytical labs that report nitrate results include information concerning MCL and health effects to homeowners who submit samples for testing.
Cooperative Extension Service, Committee	Distribute University of Idaho publications to homeowners in priority areas through mass mailings or through distribution by local retailers, and develop new publications, as needed. Educational materials should address fertilizer/pesticide application rates and impacts to groundwater.
SCDs	Promote Home-A-Syst Program to general public, and to new homebuyers through real estate agencies and bonding institutions.
Health Districts	Provide general brochure information on types of septic systems and their maintenance. Provide information to homeowner about septic system alternatives when applying for a septic permit.
Committee, all agencies	Tie all education efforts together. Develop a web site that provides information about all nitrate sources and the connection to ground water quality. Utilize resources of private sector for outreach and education (e.g. distribute information to new residents through title companies).
IDEQ, Committee	Work with communities to promote proper fertilizer application in Parks, cemeteries, schools and golf courses.

Table 3. Studies/Research

Implementing Entity	Strategy
IDEQ, IDWR, USGS, ISDA	Utilize GIS and conduct monitoring using a systematic approach, through coordinated effort by all agencies, to characterize land use activities and their impacts. Develop ground water monitoring projects to determine the actual contributions of septic systems, residential fertilizer use, and agricultural fertilizer use. Evaluate seasonal nitrogen loading, with evaluation of soils and fertilizer load. Evaluate impact over time of "optimum" application rates and rates over "optimum". Determine the proportional contribution of "normal" application to the amount of nitrate concentration present in the area. Identify where CAFOs are located in a Nitrate Priority Area and collect site-specific data.
ISDA	Continue to use isotope testing to characterize source of nitrates, where appropriate.
IDWR	Strengthen and improve the availability and quality of data available through IDWR Clearinghouse.
Committee, all agencies	Identify hotspots and associated sources, by industry or region, through best available scientific information and lab analysis that include approved Quality Assurance/Quality Controls. Efforts to identify hot spots should be criteria-driven. Well logs could provide information. Focus implementation activities on hot spots in Nitrate Priority Area.
IDEQ	Follow up on nutrient pathogen study with monitoring and modeling to determine accuracy and value.
Committee	Investigate change to current restriction of domestic irrigation limits of ½ acre to allow more pumping of shallow aquifer (< 30 feet in depth) with IDWR through pilot project so that nitrate in ground water can be used (remediation). Track fertilizer application and perform nutrient budget as part of project.
IDEQ	Refine criteria used to establish nitrate priority areas. Use existing level 2 Nutrient/Pathogen studies and best available scientific data to refine nitrate priority areas.
ISDA	Research alternative operation and remediation techniques for use in animal feeding operations (e.g. permeable barriers, anaerobic digesters).

Table 4. Irrigated Agriculture Strategies

Implementing Entity	Strategy
Committee, ISDA, SCDs, NRCS	Implement a demonstration project that will pay participants for yield losses if they occur when using University of Idaho fertilizer application guidelines.
ISDA, SCDs, NRCS	Continue to use the ISDA "One Program" to help farmers in priority areas develop BMPs.
ISDA, SCDs, NRCS	Continue to work with producers to develop nutrient/irrigation management plans.
ISDA, SCDs, NRCS	Promote/conduct soil testing. Use only labs on approved list of North American Proficiency Testing Program

Table 5. Animal Feeding Operation Strategies

Implementing Entity	Strategy
ISDA, SCDs, NRCS	Include USDA or state recommendations for amount of land required for each animal in a CAFO operation to spread manure based on nitrogen application, crop uptake, and soil sampling.
Committee, ISDA, SCDs, NRCS	Increase funding/resources for ISDA for followup evaluations at CAFOs with high nitrates. Evaluate number of problems and plan additional funding for agency and contractor resources.
Committee	Support legislation for activities by the Department of Agriculture to control third party manure management through nutrient management planning activities.
ISDA, SCDs, NRCS	Large CAFOs should be regulated as industrial facilities. New applications pose a different scenario than existing operations. Require groundwater testing and/or nutrient loading study (nutrient/pathogen type study) for all proposed CAFOs especially in areas with higher risk potential (e.g. shallow groundwater, fractured rocks). Develop approval criteria that consider the results of this ground water monitoring. Determine the potential impacts of animal feeding operations and dairies to groundwater based on groundwater separation, soil profiles and animal density per acre through CAFO siting team. Approval criteria (currently used for new subdivisions) should also apply to all new land use changes (Including CAFOs). Wastewater treatment and boundary restrictions currently apply only to subdivisions, but should apply to all.

Counties	Identify specific areas or zones where new CAFOs should not be located, where they will be compatible with existing land uses. Need to identify how we want the County to develop. This can be done through ongoing development of the Comprehensive Plan and Map. Do not continue to rely on Conditional Use Permits to control land use changes. Establish minimum distance for new residential subdivisions in relation to CAFOs. Wind and geography should be considered in placement.
Committee	Support legislation to require nutrient management plans for all animal-feeding operations.

Table 6. Septic System Strategies

Implementing Entity	Strategy
IDEQ, health districts	Continue to require Nutrient/Pathogen studies in Nitrate Priority areas. Work with developers upfront on treatment solutions, using best available scientific information.
IDEQ, health districts	Target septic systems for upgrades or retrofits in Nitrate Priority Area. Provide funding through grants or loans for upgrades or retrofits.
Committee, IDEQ, health districts	Explore installation of sewer or creation of Unified Sewer Districts in high-growth areas and in areas of impact.
Committee, IDEQ, health districts	Encourage cities to give higher funding priority to sewer systems in Nitrate Priority areas.
Committee, IDEQ, health districts	Encourage cities to allow access for hookup of sewer projects (high pressure systems) outside of the City where feasible. These systems would include annexation agreements.
Committee, IDEQ, health districts	Encourage that septic exploration bore holes should be sealed and backfilled.

Table 7. Land Application of Wastewater

Implementing Entity	Strategy
IDEQ	Utilize information generated at land application sites to refine nitrate budget for certain crops.

IDEQ, permittees	IDEQ will continue to work with facilities to issue and/or re-issue wastewater land application permits to land apply wastewater, prevent runoff, and protect ground water quality. Implementation will rely on the current permitting practices of IDEQ with input from the land appliers. Additionally, appliers will commit to the continued use of the Operation and Management Plans and Monitoring Plans required by their permits.

Table 8. Well Construction/Abandonment

Implementing Entity	Strategy
Committee, IDWR	Encourage highway departments to inventory shallow injection wells.
Committee, IDWR	Encourage proper well abandonment. Encourage government support and potential funding of this effort (e.g., loans).
Committee, IDWR	Provide information to homeowners on potential problems with older systems due to backflow problems.
Committee, IDWR	Promote testing of injection wells and discontinue use if they become contaminated.

Table 9. Funding

Implementing Entity	Strategy
Committee	Seek Section 319 monies to implement nutrient/irrigation management demonstration projects and educational activities.
Committee	Set priorities for where money will be spent. Determine cost/benefit relationship of each strategy and use to set priorities.

Table 10. General Strategies

Implementing Entity	Strategy
Committee, agencies	Begin implementation by getting support of County Commissioners, following by town hall meetings.
Committee, all agencies	Encourage closer cooperation among agencies as part of implementation activities (e.g. DEQ/IDA, IDWR/Health Districts, USGS)
Committee	Solicit support and resources from agricultural organizations for Plan activities, notably education.
Committee, IDWR, drillers, health districts	Encourage agency communication and exchange of information with well drillers. Establish a dialogue between well drillers, IDWR, health districts.

Committee	Implement pilot projects first to see what is practical
Counties	Encourage Transfer of Development Rights (TDRs) to be reconstituted and used in Canyon County.
Committee	Investigate legislative options to increase gray water use and continue to promote gray water use.

6.0 Plan Evaluation

The primary goal of this plan and the Ground Water Quality Rule is to reduce the contamination of nitrate in the aquifer so that the area is no longer on the statewide nitrate priority list. Due to the slow nature of ground water movement, it is not anticipated that quantitative reductions in nitrate levels will occur during the early implementation of the plan. Therefore, qualitative measures will be used to evaluate the progress and success of the plan in the short term (3 – 5 years). Once the plan is in place and is being implemented, the Committee recommends that the following activities occur to evaluate the progress made in reducing nitrate contamination of the ground water.

- The Committee will meet annually to review implementation activities that have occurred and evaluate available monitoring results.
- The Committee will evaluate Plan effectiveness and modify as needed.
- The Committee will annually evaluate Plan activities based on population and land use changes.

A compilation of findings from federal, state, and local agencies will be made each year. The IDEQ, with the support of the Committee, will be the lead entity to compile and provide this information. The first review would be scheduled for 2006.

The qualitative evaluation will assess whether the appropriate institutions promoted the plan recommendations, and will include the documentation of activities, practices and alternatives that have been adopted to reduce nitrate loading to the ground water. This evaluation will also consider whether the protection strategies are still being promoted and what percentage of the citizens, businesses, and other organizations are participating in the plan.

Periodically a quantitative evaluation will be performed on a longer interval to document the trend of nitrate levels since implementation of the plan. The ISDA (Ground Water Program) and IDWR (Statewide Ambient Ground Water Quality Monitoring Program) will continue to sample for nitrate on a regular basis. The IDEQ will assist with or will conduct follow-up activities that may include monitoring in response to detections of concern in public water systems or from other agencies. The determination of the success of this management plan will depend on the results of ongoing trend analyses, based on statistical analysis of monitoring results from the state monitoring networks. These activities will be a joint effort between IDEQ, ISDA, SWDH, IDWR and this Committee.

At each step, the Committee and governmental agencies will need to determine whether this management plan is addressing the ground water contamination concerns adequately or whether modifications need to be made to the plan to better enable success. If no improvements are noted, regulatory activities may be initiated per the Ground Water Rule (IDAPA 58.01.11.400.02).

References

Graham, William G. and Linford J. Campbell. 1981. Groundwater Resources of Idaho. Idaho Department of Water Resources.

Jensen, Scott. 2002. Quotes and information taken from a presentation given to the Scott Creek/Mann Creek Ground Water Committee on April 10, 2002. Scott Jensen is with the Canyon County Cooperative Extension Service.

Lindholm, G.F., 1996. Summary of the Snake River Plain Regional Aquifer-System Analysis in Idaho and Eastern Oregon. U.S. Geological Survey Professional Paper 1408-A.

Neely, Ken. 2001. Current Status of the Ground Water Quality in the Treasure Valley. Idaho Department of Water Resources.

Othberg, Kurt L. & Loudon R. Stanford. 1994. Geology and Geomorphology of the Boise Valley and Adjoining Areas, Western Snake River Plain, Idaho. Idaho Geological Survey, University of Idaho Bulletin #29. 544 pp.

Petrich, C.R, and S.M. Urban, 2004. Characterization of Ground Water Flow in the Lower Boise River Basin 2004. Idaho Water Resources Research Institute Research Report IWRRI-2001-01.

Pitt, Robert, Shirley Clark, and Keith Palmer. May 1994. Potential Groundwater Contamination from Intentional and Nonintentional Stormwater Infiltration, EPA/600/R-94/051, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati OH.

Priest, T.W., C.W. Case, J.E. Witty, R.K. Preece, G.A. Monroe, H.W. Biggerstaff, G.H. Logan, L.M. Rasmussen, D.H. Webb, 1972. Soil Survey of Canyon Area, Idaho. USDA Soil Conservation Service.

Squires, Edward; Spencer H. Wood and James L. Osiensky. 1992. Hydrogeological Framework of the Boise Aquifer System Ada County, Idaho. Idaho Water Resources Institute, University of Idaho.

Squires, Edward; Spencer H. Wood, James L. Osiensky, Rodger D. Dittus. 1993. Groundwater Conditions and Hydraulic Testing of the Boise-Fan Aquifer of Southeast Boise River Valley, Ada County, Idaho. A report prepared for Boise Water Corporation.

Whitehead, R.L., 1992. Geohydrologic framework of the Snake River Plain regional aquifer system, Idaho and eastern Oregon. U.S. Geological Survey Professional Paper 1408-B.

Wood, S.H., and J.E. Anderson, 1981. Chapter 2 of Geology, Mitchell, J.C., ed., Geothermal investigations in Idaho, part II, Geological, hydrological, geochemical, and geophysical investigations of the Nampa-Caldwell and adjacent areas, southwestern Idaho: Idaho Department of Water Resources Water Information Bulletin 30.

Neely, K.W. and Crockett, J.K., 1998. Ground Water Quality Characterization and Initial Trend Analysis for the Treasure Valley Shallow and Deep Hydrologic Subareas. No. 50 Part 3, Idaho Department of Water Resources.

Neely, K., 2001. Current status of ground water quality in the Treasure Valley - July, 2001, Idaho Department of Water Resources. Current Status of Ground Water Quality in Treasure Vally - July 2001[PDF]

Appendix A. Soil Information

Soils Information

Table A-1 summarizes soil descriptions taken from the Soil Survey of Canyon Area, Idaho (Priest et al., 1972). The descriptions are very general, and only consider the major soil units in the area.

Table A-1. Soil Association, Locations and General Characteristics

Soil Association	General Location	Characteristics
Turbyfill-Cencove-Feltham	Northwest to south along the Snake River including terraces near Sunnyslope, Central Cove and Apple Valley.	Composed of fine sandy loams and loamy fine sands. Generally moderate and is well to somewhat excessively drained
Greenleaf-Nyssaton-Garbutt	Northwest portions of NPA including the high lake terraces and alluvial fans located north of the Boise River near Parma and south of the Boise River near Greenleaf and Wilder.	Composed of silt loam to loam material and are well drained
Scism-Bahem-Trevino	Southern portions of NPA located on the high plateaus and terraces south of Lake Lowell and extend from Dry Lake and Lakeview to Bowmont and Melba.	Shallow to deep and composed of well drained silt loams. The soils overlie alluvial sediments or basaltic bedrock.
Minidoka-Marsing-Vickery	Central to southern portion of NPA found on the high ridges north and south of Lake Lowell.	Silt loams and loams over hardpan or gravel on high terraces.
Power-Purdam	Northern portion of NPA on the high river terraces south of the Boise River near Caldwell, north of Nampa, and near Huston.	The soils located on the high parts of the terraces are well drained, while the soils on the narrow bottom lands of streams and drainages are poorly drained in some areas. The soils are composed of silt loam or loam with a silty clay loam or silt loam subsoil.
Moulton-Bram-Baldock	Bottomlands along the Boise River	Composed of fine sandy loams to silt loams of the association and are somewhat poorly to moderately well drained.
Power-Potratz	High terraces and uplands east and southeast of Nampa	Deep to moderately deep and composed of well drained silt loams. On the higher parts of the terrace, well drained and mainly underlain by basalt.

Appendix B. Nitrate Budget

(Report included as a separate file.)

Appendix C. Glossary

Glossary

Animal Feeding Operation (AFO) – The holding of any number of animals in buildings, pens, or lots.

Agricultural activity/Agriculture – Any activity conducted on land or water for the purpose of producing an agricultural commodity, including crops, livestock, trees, and fish.

Ambient – The best-assumed level of water quality prior to human land use activities.

Anti-backflow (anti-back siphoning) device – A check valve or other mechanical device to prevent the unwanted reverse flow of liquids back down a water supply pipe into a well.

Aquifer – A geological formation of permeable saturated material, such as rock, sand, gravel, etc., capable of yielding economically significant quantities of water to wells and springs.

Background concentration – is defined in two different ways:

Natural background ground water quality – The ground water quality unaffected by man.

Site background ground water quality – The ground water quality directly up gradient of a site.

Beneficial uses – Various uses of ground water in Idaho include, but are not limited to, domestic water supplies, industrial water supplies, agricultural water supplies, aquacultural water supplies, and mining. A beneficial use is defined as an actual current or projected future use of ground water.

Best management practice (BMP) – A practice or combination of practices determined to be the most effective and practical means of preventing or reducing contamination to ground water and/or surface water from nonpoint and point sources in order to achieve water quality goals and protect the beneficial uses of the water.

Coliform – A type of bacteria found in water that, when present in drinking water, carries the risk of spreading a water-borne illness.

Compost – A biologically stable material derived from the biological decomposition of organic matter.

Constituent – an element or component.

Contaminant – Any chemical, ion, radionuclide, synthetic organic compound, microorganism, waste or other substance that does not occur naturally in ground water, or a constituent that occurs naturally that may cause health concerns.

Crops needs – Factors required by a crop in order to grow, such as water, nutrients, and sunlight.

Crop root zone – The zone that extends from the surface of the soil to the depth of the deepest crop root and is specific to a species of plant, group of plants or crop.

Crop uptake – Water and nutrients actually used by the crop.

Degradation – When a numerical ground water quality standard has been exceeded.

Denitrification – The volatilization of nitrate into nitrogen gas, which dissipates into the air.

Effluent, solid or liquid – Any waste material moving away from its point of origin.

Fertilizer – Any substance containing one or more plant nutrients utilized to enhance plant nutrient content and/or for promoting plant growth.

Ground water – Any water that occurs beneath the surface of the earth in a saturated geological formation of rock or soil.

Ground Water Quality Rule – Values, either numeric or narrative, assigned to any contaminant for the purpose of establishing maximum levels or protection.

Infiltration rate – The rate at which water infiltrates or seeps into the soil.

Injection well – The subsurface emplacement of fluids. The purpose of injection by Class V wells is the temporary or permanent disposal or storage of fluids into subsurface geologic formations.

Irrigation water management – Determining and controlling the rate, amount and timing of irrigation water in a planned and efficient manner.

Leach – To dissolve nitrogen (or other constituents) in water, potentially enabling these constituents to reach the ground water.

Legume – Crops having nodules on the roots containing bacteria that are able to convert nitrogen in the air into a usable form for the plant.

Liquid manure – A mixture of water and manure that can be pumped, generally less than 10 percent solids.

Livestock wastes – A term sometimes applied to manure that may also contain bedding, spilled feed, water or soil. It also includes wastes not particularly associated with manure, such as milking center or washing wastes, milk, hair, feathers or other debris.

Local government – Cities, counties and other political entities of the state.
Manure – The fecal and urinary excretions of livestock and poultry.

MCL (Maximum Contaminant Level)- The maximum level a contaminant is considered safe for human health as determined by the U.S. Environmental Protection Agency.

Mg/L (Milligrams per liter) – The weight of a substance measured in milligrams contained in one liter.

Mineralization – Increases in concentration of one or more inorganic constituents resulting from contact of ground water with geologic formations.

Nitrate – A common contaminant identified in ground water that is a crop nutrient. It is a component in fertilizer, is found in wastes at the soil surface, and occurs naturally in the soil, through a process such as mineralization of organic nitrogen. The MCL for nitrate is 10 mg/l.

Nitrification – Microbial oxidation of ammonia to nitrate.

Nitrogen-fixing crop – A crop that is able to take nitrogen from the air and convey it to microorganisms in soil for consumption.

Nonpoint source – A contaminant or pollutant released in a diffuse manner of entry into a water body so there is no identifiable or specific point of entry.

Nutrient – Any substance applied to the land surface or to plants that is intended to improve germination, growth, yield, product quality, reproduction, or other desirable characteristics of plants.

Nutrient management – Managing the amount, form, placement and timing of the plant nutrient applications.

Nutrient management plan – A plan for managing the amount, placement, form and timing of the land application of nutrients and soil amendments.

Nutrient-pathogen study – A study whose primary purpose is to determine the linkage between nutrients and pathogens, particularly how they enter surface water or ground water.

Organic matter – Substances of biological origin that contain carbon-decaying cells of plants, microorganisms, or small animals.

Organic nitrogen – A form unavailable to plants until the mineralization process takes place. Most of this type of nitrogen is bonded to carbon in living and decaying cells of plants, microorganisms, or small animals.

Point source – A contaminant or pollutant, often released in concentrated form, from a conveyance system or discrete source, such as from a pipe, into a body of water.

Pond – A water impoundment made by constructing a dam or an embankment or by excavating a pit or dugout.

Process water – Water used in a facility or an AFO that cleans equipment, the facility, or animals.

Public Water Systems – Serves at least 15 service connections used by year-round residents or regularly serves a population of at least 25 year-round residents.

Recharge area – An area in which water infiltrates the soil or geological formation through precipitation, irrigation practices, and/or seepage from creeks, streams, lakes, etc., and percolates into one or more aquifers.

Residual nitrogen/nutrients – Residual or unused nitrogen remaining in the soil after a crop is harvested.

Root zone – The zone within a soil profile where the roots predominate, normally at 0 – 9 inches of soil depth.

Soil characteristics – Parameters, often generated from lab tests, used to describe or quantify the basic characteristics of a soil.

Soil profile – A vertical section of soil delineating the distinct horizontal layers of various soils and geologic formations in a given area.

Solid manure storage – A storage facility in which accumulations of bedded manure or solid manure are stacked before subsequent handling and field spreading.

Total maximum daily load (TMDL) – Determination of water bodies capacity to support beneficial uses.

Volatilization – The dissipation of gaseous components, such as ammonium nitrogen, from animal manure or other substances.

Waste storage pond – An impoundment made by excavation or earthfill for temporary storage of industrial or agricultural waste.

Waste treatment lagoon – An impoundment made by excavation or earthfill to biologically treat industrial or agricultural waste.

Wastewater – Process water after use within a facility or AFO; the water is usually treated prior to disposal.

Water quality – The excellence of water in comparison with its intended use or uses.

Well bore – The actual hole dug by a well drilling rig.

Well cap – A manufactured device installed at the top of a well casing that creates an airtight and watertight sanitary seal to prevent surface water and contaminants from infiltrating the ground water supply.

Wellhead – The physical structure, facility, or device at the land surface from or through which ground water flows or is pumped from subsurface water-bearing formations.

Appendix D. Acronyms

Acronyms

AFO	Animal Feeding Operation
BMP	Best Management Practice
Committee	Lower Boise/Canyon County Nitrate Management Advisory Committee
EPA	United States Environmental Protection Agency
FSA	Farm Service Agency
IASCD	Idaho Association of Soil Conservation Districts
IDEQ	Idaho Department of Environmental Quality
IDOC	Idaho Department of Commerce
IDWR	Idaho Department of Water Resources
ISCC	Idaho Soil Conservation Commission
ISDA	Idaho State Department of Agriculture
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
SCD	Soil Conservation District
SWCD	Soil and Water Conservation District
SWDH	Southwest District Health
TMDL	Total maximum daily load
USDA	United States Department of Agriculture
U of I	University of Idaho

Appendix E. Agency Roles, Programs and Responsibilities

Agency Roles, Programs and Activities

The following is a brief description of the roles and activities of the participating agencies and organizations.

Lower Boise/Canyon County Nitrate Management Advisory Committee (Committee)

The Lower Boise/Canyon County Nitrate Management Planning Committee was formed as a pro-active measure to address local ground water quality degradation. The Committee is composed of local area residents and government agencies that represent the broad range of interests within the area. IDEQ is the lead agency assisting the Committee in development and implementation of this management plan to address the ground water degradation in the area from nitrate.

United States Department of Agriculture – Natural Resources Conservation Service (NRCS)

The NRCS coordinates and implements the Agricultural Conservation Program, which is administered to restore and protect land and water resources and preserve the environment. Activities include working with the local Soil Conservation Districts to implement technical and financial assistance programs related to soil and water resources. The NRCS, in cooperation with the Farm Services Administration, IDEQ, and ISDA, can perform public, group, and individual demonstration projects to ensure the acceptance of the established BMPs by industry and the community. Land operators will benefit from this assistance in the planning and implementation of nutrient, pest control, and irrigation management plans designed to protect ground water and surface water quality with “best management systems.”

Soil Conservation Districts

Primary activities of the Soil Conservation Districts include soil erosion control; conservation and development of water resources; control of water pollution from agricultural nonpoint sources; and protection, conservation, development, and enhancement of the quality and productive potentials of land and water resources in Idaho. The Soil Conservation Districts are administered and coordinated by the Idaho State Department of Agriculture (ISDA).

Southwest District Health

The Southwest District Health Department (SWDH) is responsible for permitting subsurface sewage disposal systems and for the administration of sanitary restrictions for subdivisions. SWDH Environmental Health Services regulates

subsurface sewage disposal systems along with the IDEQ through and application/permitting process for a subsurface sewage disposal system, a pre-requisite to obtaining a building permit from the county. SWDH is also vested with the responsibility of releasing sanitary restrictions or maintaining sanitary restrictions in force on all platted subdivisions under Idaho Code, Title 50, Chapter 13. SWDH works in cooperation with the Idaho Department of Environmental Quality (IDEQ), by releasing sanitary restrictions on platted subdivisions having city water and city sewer only after IDEQ has conducted the necessary reviews of the specifications.

Subdivisions utilizing individual wells and individual subsurface sewage disposal systems must meet the Subdivision Engineering Report (SER), through SWDH prior to releasing sanitary restrictions. Additionally, SWDH may require a Nutrient Pathogen Study; depending on the location of the subdivision, size of the lots, and density of dwellings. Subdivisions utilizing a combination of public and individual systems must work with both SWDH and IDEQ in order to satisfy the requirements necessary to release sanitary restrictions

University of Idaho Cooperative Extension System

The University of Idaho and its Cooperative Extension Service provide research information and educational programs. Extension has responsibility to prepare news items, bulletins, publications and educational material to inform and educate the general public about water quality issues. Extension provides agri-chemical application and rate recommendations, based on research, and consistent with water quality goals.

Idaho Department of Water Resources (IDWR)

The IDWR administers surface and ground water programs and activities predominately related to water supply issues. IDWR also has responsibilities for ground water quality in areas such as Statewide Ambient Ground Water monitoring, managed recharge, injection wells, well drilling permits and water rights.

IDWR can assist with this ground water management plan in the following ways:

- Continue to conduct hydrogeologic characterization studies.
- Continue to enforce well construction standards and determine if stricter standards are needed.
- Ensure proper regulation and distribution of water in accordance with water rights and allocation.
- Recommend solutions where ground water quality problems exist or may be emerging.

IDWR cooperates with and assists other agencies involved in the planning and implementation of measures designed to protect the ground water quality and improve the efficiency of water use.

Idaho State Department of Environmental Quality (IDEQ)

The Idaho Department of Environmental Quality is designated as the primary agency to coordinate and administer ground water quality protection programs for the state (Ground Water Quality Protection Act of 1989, Idaho Code 39-120). Various state and local agencies have responsibilities for and are involved in implementing the Ground Water Quality Plan (adopted in 1992 and amended in 1996). The Ground Water Quality Rule (IDAPA 58.01.11.400.02 and IDAPA 58.01.11.400.03) sets forth a number of alternative actions that the IDEQ may follow when a numerical ground water quality standard has been exceeded, or when a standard has not been exceeded, but significant degradation of the ground water has been detected.

The IDEQ has the following responsibilities:

- Assist in developing a regional ground water monitoring network and performing periodic water quality assessments to evaluate the performance of the management action plan in reducing the ground water contamination resulting from the identified sources of contamination.
- Establish monitoring requirements to determine water quality conditions; establish and coordinate local monitoring efforts to obtain information on ground water quality.
- Work in conjunction with the Committee, ISDA and other state and local agencies to periodically evaluate and assess the implementation of the action plan and to determine whether the plan is effective in reducing nitrate loading to the ground water. Also to assist the Committee as requested.
- Administer rules and regulations for the permitting of land application of wastewater.
- Carry out the provisions of the federal Safe Drinking Water Act by establishing drinking water standards, certifying water and treatment systems, and operators. IDEQ is responsible for identifying health hazards and issuing public notification on such hazards.
- Perform risk assessments concerning ground water quality and provide for the regulation and protection of all public water supplies within the management area.

Idaho State Department of Agriculture (ISDA)

The ISDA is the lead state water quality agency to implement agricultural laws and rules, water quality management and planning, engineering and technical services, monitoring, permits, and education and licensing efforts related to agriculture. The ISDA implements the Agricultural Ground Water Quality

Protection Program for Idaho and the Agricultural TMDL Implementation Monitoring Program. The ISDA is also responsible for the regulation of fertilizers, soil and plant amendments, and dairy and feedlot facilities. Disposal of on-site animal waste (manure) from concentrated animal facilities is regulated through a Memorandum of Agreement between EPA, IDEQ, and ISDA.

The ISDA is involved with the identification of existing agricultural management practice problems and in the development and implementation of alternative practices. The ISDA networks with the Soil Conservation Commission and Soil Conservation Districts to provide technical and financial assistance to farmers for conservation projects, research and demonstration projects, and public education and information.

Idaho Soil Conservation Commission (ISCC)

The ISCC provides administrative, financial, and technical support to all of the Soil and Water Conservation Districts in the state. The ISCC and Soil Conservation Districts develop annual work plans, review and evaluate district projects, practices, budgets, and contracts, and assist districts in meeting their obligations.

City and County Governments

The Ada and Canyon County Planning and Zoning (P & Z) Commissioners and the Boards of Commissioners are involved in rural residential and agricultural land use. County P & Z administrators and building inspectors issue building permits to build on land and enforce code provisions. The P & Z Commissions review land partitions, subdivision proposals, requests to rezone properties, and special use permits, and makes recommendations to the County Boards, as well as make suggestions for amendments to the county comprehensive plan. The role of local government is to educate the public about ground water quality concerns and planning for development compatible with the protection of ground water.

Table E-1. Existing Programs and Activities

Program/Activity	Purpose/Objective	Contact
Idaho Dept. of Agriculture		
Agricultural Ground Water Quality Monitoring and Protection Program	Technical Assessment & Assistance Protection Plans Education and Outreach Implementation of BMPs Regulation Monitoring	Rick Carlson 332-8599
IDAPA 02.03.03 Pesticide and Chemigation Use and Application	Regulation of irrigation systems for application of pesticides and fertilizers	Fred Rios 442-2816
USEPA, IDEQ, ISDA Idaho Dairy Pollution Prevention Initiative, Memorandum of Understanding Idaho Dairy Industry (Idaho Code, Title 37, Chapter 3, 4, 5, and 7) IDAPA 02.04.14 Rules Governing Dairy Waste IDAPA 02.04.15 Rules Governing Beef Cattle animal Feeding Operations	Regulates management of nutrients of on-site animal waste from all licensed dairy farm and beef operations. Rules for dairy operations Dairy waste inspections for compliance with Clean Water Act and ISDA regulations	Marv Patten 332-8551 John Chatburn 332-8540
Idaho Dept. of Environmental Quality		
Regional and local ground water quality monitoring	Investigations of ground water contamination	Tom Neace 373-0183
IDAPA 58.01.03 Individual/Subsurface Sewage Disposal	Review of subdivision engineering report and nutrient pathogen evaluation	

Land application of wastewater: IDAPA 58.01.02.600 Idaho Regulations, Water Quality Standards and Wastewater Treatment Requirements IDAPA 58.01.17 Wastewater-Land Application Permit Regulations	Permitting of wastewater land treatment systems	Paul Wakagawa 373-0550
Idaho Source Water Assessment and Protection Program	Assessments Drinking Water Protection Plans	Pam Smolczynski 373-0461
Lower Boise River Total Maximum Daily Load (TMDL)	Subbasin Assessment (SBA), an assessment of surface water quality conditions Implementation Plan	Julia Achabal 373-0550
Idaho Dept. of Water Resources		
Statewide Ambient Ground Water Quality Monitoring Program	Statewide monitoring network with USGS assistance to characterize ground water quality, identify trends and changes, and identify potential problem areas Data analysis and report preparation	Ken Neely 287-4852
IDAPA 37.03.09 Well Construction Standards Rules IDAPA 39.03.10 Well Driller Licensing Rules	Well driller licensing Well construction and operating permitting Well abandonment	Mark Slifka 287-4935
Health Districts		
Land Development Program/Sanitary restrictions IDAPA 58.04.02 community Subsurface Sewage Disposal Systems IDAPA 58.01.03 Rules for Individual/Subsurface Sewage Disposal Systems IDAPA 58.01.15 Regulations governing the Cleaning of Septic Tanks)	Conduct site evaluations Issue system permits Issue septic tank pumper licenses Conduct inspections Establish design standards and accepted waste management practices for private septic system Establish criteria for permit issuance Establish soil site evaluation standards for placement of septic systems	Brian Crawford Dave Loper 465-8402
USDA Natural Resources Conservation Service		
Environmental Quality Incentives Program (EQIP)	Provides financial and technical help with structural and management conservation practices on agricultural land	Jeff Bohr x 130 454-8695

Wildlife Habitat Incentives Program	Voluntary program for people who want to develop and improve wildlife habitat	
Wetlands Reserve Program	Voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands	
Soil and Water Conservation Assistance (SWCA)	Cost share and incentive payments to farmers and ranchers to voluntarily address threats to soil, water, and related natural resources, including grazing land, wetlands, and wildlife habitat.	
U.S. Geological Survey		
Ground water monitoring	Regional and site-specific monitoring studies	Deb Parliman 387-1326
Ada County Development Services		
Comprehensive Plan		Diana Sanders 287-7900
Development Review:	Land partitions Subdivision proposals Rezoning requests Special use permits	
Canyon County Development Services		
Comprehensive Plan		Donna West 454-7458
Development Review	Land partitions Subdivision proposals Rezoning requests Special use permits	
Idaho Soil Conservation Commission **Idaho Association of Soil Conservation Districts** **Ada and Canyon County Soil Conservation Districts**		
Idaho Home*A*Syst Project	Education	Scott Koberg 338-5900
State Agricultural Pollution Abatement Plan	Agricultural BMP implementation	

IDAPA 02.05.02 Rules for Antidegradation Plan for Agriculture Water Quality Program for Agriculture IDAPA 02.05.03 Rules for Administration of Agriculture Water Quality Cost-Share Program		
Resource Conservation and Rangeland Development Loan Program (RCRDP)	Loans up to $100,000 and Grants up to $10,000	
University of Idaho, Cooperative Extension Service		
	Information and education Agricultural research	Jerry Neufeld 459/6003

Appendix F. Resources

Resources

Agency Web Sites

Idaho Department of Environmental Quality Programs
http://www.deq.state.id.us/water/water1.htm#moas

Idaho Department of Water Resources
http://www.idwr.state.id.us/planpol/techserv/gwmon/statewide.htm

Idaho Soil Conservation Commission
http://www.scc.state.id.us/waq.htm

University of Idaho Extension Service
http://www.uidaho.edu/extension/

Environmental Protection Agency
http://www.epa.gov/OGWDW/

Southwest Health District Department
http://www.publichealthidaho.com/

Canyon County Development Services
http://www.canyoncounty.org/dsd/

Idaho Department of Agriculture, Water Quality Program
http://www.agri.state.id.us/gw/default.htm

Water Quality Information

Canyon County Ground Water Study along the Boise River Corridor, Canyon County, Idaho, Dec. 2000
http://www.deq.state.id.us/water/gw/wq_status_report/Water%20Quality%20Status%20Report.pdf

Western County Estates Report, 2003
http://www.deq.state.id.us/water/gw/WesternCountryEstates_Report_Feb03.pdf

Lower Boise/Canyon County Nitrate Degraded Ground Water Quality Summary Report, Dec 2001
http://www.deq.state.id.us/water/gw/CanyonCo_NitrateDegraded_GW.pdf

Health Effects of Nitrate

Bureau of Community and Environmental Health, Idaho Division of Health, Nitrates in Drinking Water http://www2.state.id.us/dhw/behs/nitrates.htm

Agency for Toxic Substances and Disease Registry, Case Studies in Environmental Medicine: Nitrate/Nitrite Toxicity www.atsdr.cdc.gov/HEC/CSEM/nitrate/exposure_pathways.html

Environmental Protection Agency, Consumer Fact Sheet on Nitrates www.epa.gov/safewater/contaminants/dw_contamfs/nitrates.html

Department of Environmental Quality, "Nitrates in Groundwater" http://www.deq.state.id.us/water/gw/nitrates_in_gw.pdf

General Information

Treasure Valley Hydrology
http://www.idwr.state.id.us/water/tvalley/default.htm

Well Construction Standards
http://www2.state.id.us/adm/adminrules/rules/idapa37/0309.pdf

Health District Brochures
http://www.publichealthidaho.com/brochures.asp

Best Management Practices Information

Agriculture

Sources of additional information for this category include the Idaho One Plan, a catalog of best management practices at http://www.oneplan.org; the USEPA Office of Water *Management Measures to Control Nonpoint Sources Pollution from Agriculture at* http://www.epa.gov/owow/nps/agmm/ ; the Idaho Department of Agriculture, Agricultural Water Quality Program web site at http://www.agri.state.id.us/gw/WaResTOC.htm; the USDA Natural Resources Conservation Service (NRCS), *Comprehensive Nutrient Management Planning – Technical Guidance* at http://www.nrcs.usda.gov/technical/nutrient.html; and the NRCS *National Handbook of Conversation Practices,* at http://www.ftw.nrcs.usda.gov/nhcp_2.html.

Septic Systems

An excellent reference for the most complete and current information on management options for septic systems is the **National Small Flows Clearinghouse (NSFC)**. Established by the USEPA under the 1977 CWA, the NSFC gathers and distributes information about small community wastewater systems through a catalog of publications and other products, free newsletters, a computer bulletin board, computer databases, telephone consultation and referral service, and related programs. The Clearinghouse can be contacted at 1-

800-624-8301, or at National Small Flows Clearinghouse, West Virginia University, P.O. Box 6064, Morgantown, WV 26506-6064.

Other materials used for this category are the IDEQ A Homeowner's Guide to Septic Systems at http://www2.state.id.us/deq/water/gw/septicsystem_brochure.htm, the University of Idaho College of Agriculture, Cooperative Extension System, Care *and Maintenance of Your Home Septic System* at http://info.ag.uidaho.edu/Resources/PDFs/CIS1027.pdf, the Septic Information Website *Inspecting, Designing, & Maintaining Residential Septic Systems* at http://www.inspect-ny.com/septbook.htm, and EPA's *Design Manual for Onsite Wastewater Treatment and Disposal Systems* (1980), currently under revision.
Information distributed by the Southwest District Health Department can be found at http://www.publichealthidaho.com/septic-systems.asp